PROPOSE NEW FRAMEWORK FOR NETWORK PERFORMANCE TESTING STRATEGY

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DECLARATION

I declare that this dissertation entitled “Propose New Framework for Network Performance Testing Strategy” is the result of my own research except as cited in the references. The dissertation has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : ……..

Name : ……..

Date : ……..……

APPROVAL

I hereby declare that I have read this dissertation and in my opinion this dissertation is sufficient in term of scope and quality for the award of Master of Computer Science (Internetworking).

Signature : ……..

Supervisor Name : ……..

Date : ……..……

DEDICATION

I lovingly dedicate my dissertation to my beloved wife Zuraini Binti Zainal who supported me each me step way. To my precious sons and daughter, Affi Hazeem, Aqil Hadeef and Arissa Mea Humaira who give me passion and strength with their smile. You are " Anugerah Allah yang Terindah"

.

ABSTRACT

Performance evaluation is one of the main concerns in the communication system. In any communication implementation, to determine the performance factor of the network, a testing of end-to-end connection process flow is required. An effective and coordinated testing procedure plays an important role in evaluating the performance of the network. Therefore, this study proposes a testing framework which specifies the types of communication mediums and technologies, the evaluation criteria and tools to carry out the testing. The proposed testing scheme is used as a guideline to analyze and measure the performance of the real time network.

ABSTRAK

Dalam sistem komunikasi, penilaian prestasi merupakan sesuatu yang perlu diberikan perhatian. Di dalam mana-mana pelaksanaan sistem komunikasi, bagi menentukan faktor prestasi rangkaian, ujian aliran sambungan akhir-ke-hujung perlu dilaksanakan. Keberkesanan prosedur ujian secara teratur memainkan peranan yang penting dalam menilai prestasi sesuatu rangkaian. Oleh yang demikian, kajian ini mencadangkan satu rangka kerja ujian yang menentukan jenis medium komunikasi dan teknologi, faktor penilaian dan peralatan yang akan digunakan bagi menjalankan ujian tersebut. Skim ujian yang dicadangkan akan digunakan sebagai panduan untuk mengukur dan menganalisis prestasi rangkaian dalam masa sebenar.

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LIST OF ABBREVIATIONS

LAN	Local Area Network
CPU	Central Processing Unit
TTL	Time To Live
IP	Internet Protocol
IETF	Internet Engineering Task Force
QoS	Quality Of Service
OSI	Open System Interconnection
DoD	Department of Defence
TCP	Transmission Control Protocol
ARPANET	The Advanced Research Projects Agency Network
UDP	User Datagram Protocol
FTP	File Transfer Protocol
SMTP	Simple Mail Transfer Protocol
HTTP	The Hypertext Transfer Protocol
DNS	Domain Name System
ARP	Address Resolution Protocol
ICMP	The Internet Control Message Protocol
RTT	Round-Trip Time
UTeM	Universiti Teknikal Malaysia Melaka
FTMK	Fakulti Teknologi Maklumat dan Komunikasi

SLA	Service Level Agreement
ITU-T	Telecommunication Standardization Sector
CIR	Committed Information Rate

CHAPTER 1

INTRODUCTION

With the rapid growth of the Internet, it required the network development scale well. The network interconnection device has been widely used to support this changing. The switch, router and other network interconnection device have become an important part of the network. The performance of network interconnection device will directly influence the network size, network stability and reliability, so it is necessary to accurately evaluate it. A good network performance test system is helpful to ensure the computer network can be normal, safe, efficient, rational use and operation. The network performance test instrument has become essential to evaluating performance of various types of network and network acceptance.

Successful performance testing requires a good deal of time and experience. It is a common mistake to assume testing the performance of the network is a simple task that can be conducted by any technical person with the appropriate equipment in a few weeks' time. Performance testing requires a significant amount of forethought and diligence, as well as a high level of knowledge regarding the devices and protocols to be tested, and an intimate familiarity with the tools used to do the testing. It's easy to see how comprehensive and meaningful performance testing is largely relegated to a select group of experts, while many assume it should be no problem for any engineer to produce meaningful performance metrics after only a day or two of testing.

With that said, just about anyone can learn to conduct successful performance testing. The most important factor (by far), is time. Having enough time to properly design, implement, run, tune and evaluate the test methodology, environment, devices and results is the key to success in performance testing.

In addition to time, there is one other indispensable factor when evaluating performance: forethought. Forethought implies thorough goal analysis, planning and proactive problem solving. Forethought would be regarded as more essential than time, except that a failure to think ahead can, to a degree, be compensated for if you have enough time.

1.1 Project Background

The revolution in computer networking technology nowadays demands for high bandwidth, short response time, reliable network, guaranteed application services and optimum LAN traffic flow. With this revolution, the organizations require optimum network performance to maintenance their business operations and changing customer needs. Therefore, analysis of network performance is very important to maintain and improve network efficiency from time to time. One of the important test indicators of Network performance testing is described in RFC2544 (S. Bradner (Harvard University), 2013) .The specific test methods about network performance testing is described in RFC2544. Four key indicators is defined in RFC2544 it is throughput, latency, Frame Lost Rate, and Back-to-Back. These indicators are the basis for the evaluation of network devices and the basis for evaluate the Ethernet devices also the networks. However, the RFC2544 only describe the performance characteristics of a network interconnecting device but not describe the network testing strategy.

1.2 Problem Statement

Most network managers regularly find themselves working or involved with user complaints regarding with the network problem. These complaints concerns about poor access times, no access to resources or session failures. All network managers must determine the operational guidelines that their network services and users will find acceptable. These operational conditions can be considered normal for that network. Studies have shown that network managers are betting on increased bandwidth as the solution to network problems.

Studies that had been done show that, (Quang, See, Chee, Xuen, & Karuppiah, 2013) propose a performance testing framework to unify different testing method, (Karuppiah, 2013) propose a testing framework which specific the type of communication and (Dumitrescu, Raicu, Ripeanu, & Foster, 2004) also propose a distributed performance-testing framework designed to simplify and automate service performance evaluation. No testing strategy to performance the network performance analysis are defined.

A well-defined and properly implemented network testing strategy with correct parameter and network characteristics will help the network manager predict the operation of the network. With network testing strategy, the network testing can be measure and recording the network's state of operation over a period of time. It involves recording the current state of network operation to serve as a basis for comparison or control.

1.3 Research Question

1. When do we need network testing?

Comprehensive network testing will enable a network manager to maintain the network actively. This insight may allow the network manager to predict network operation under a given load, or anticipate problems created by new services.

2. What needs to be tested?

Some important network characteristics include delay/latency/jitter, throughput and packet drop. Each network should be evaluated individually. The network testing will then be developed around the relevant criteria for that network.

3. How to do it?

Requirement plan strategy to do the testing.

1.4 Objective

There are three objectives in this research:

1. To study network performance analysis framework and network performance parameters.
2. To propose new framework for performance testing strategy.
3. To test and evaluate the new testing strategy.

1.5 Research Scope

In order to achieve the Research Objectives, this research will focus on some issues as stated below:

1. To identify the classification of network performance parameters as a guideline to the proposed framework.
2. To evaluate the performance parameters for best-case scenario test parameters.
3. This new framework will be tested in Universiti Teknikal Malaysia Melaka at Faculty of Information and Communication Technology Network environment.

1.6 General Research Methodology

The research methodology has been developed in order to achieve the research objectives. The phases involved in this research methodology is illustrated in Figure 1.0 General Research Methodology.

Figure 1.1 : **G**eneral Research Methodology

1.7 Project Significant

The main purpose of this project being conducted was to identify parameters for performance testing and strategy to deploy the test. At the end of the project, new network performance testing framework strategy is produced.

1.8 Expected Result

By the end of this project, the expected results have to be achieved by the stated objectives are:

i. New framework for performance testing strategy are well define.

ii. The best network performance parameters is identified.

iii. To test and evaluate the new testing strategy

1.9 Summary

In conclusion, the problem statement, objective and scope are well defined and stated clearly in this chapter. Literature reviews on the activities contributed to the related work were conducted in the next chapter as well as the analysis of current problem and justification along with the proposed solution.